GEOL 109 VOLCANOES AND EARTHQUAKES (3)
The geological origin, occurrence, and hazards of volcanoes and earthquakes. Plate tectonic theory, efforts at forecasting these events, and effects on human populations will be discussed. GenEd II.A or Core: Biological & Physical Sciences.

GEOL 115 MARYLAND GEOLOGY IN THE FIELD (1)
A field trip course open to any student, designed to introduce geology and geology-related career opportunities. Participation in a minimum of four field trips is required.

GEOL 120 GEOLOGY OF NATIONAL PARKS (4)
Uses an array of nationally preserved landscapes to explore introductory geology topics. Students will gain an understanding of how natural forces shape the world around them in the present, in the recent past (geologically speaking), and the more distant past. They will also gain an appreciation of landscapes that have for a variety of reasons been chosen by our society to be given a high level of preservation and protection. Not open to students who have completed GEOL 121 or GEOL 122. Core: Lab and Non-Lab Science or GenEd: II.A.

GEOL 121 PHYSICAL GEOLOGY (4)
Composition and structure of the earth, the internal and external forces acting upon it, and the surface features resulting. Laboratory studies of common rocks and minerals, geologic and topographic maps, and aerial photographs. Field trips required. Three lecture hours and three laboratory hours per week. Not open to students who successfully completed PHSC 121. Gen Ed II.A or Core: Biological & Physical Sciences. Lab/Class fee will be assessed.

GEOL 122 HONORS PHYSICAL GEOLOGY (4)
Composition and structure of the earth; the internal and external forces acting upon it and the surface features resulting. Laboratory studies of common rocks and minerals, geologic and topographic maps and aerial photographs. Field trips required. Three lecture hours and three laboratory hours per week. Not open to students who successfully completed PHSC 121. Prerequisite: Honors College. Gen Ed II.A or Core: Biological & Physical Sciences and Science Lab. Lab/Class fee will be assessed.

GEOL 123 HISTORICAL GEOLOGY (4)
The history and development of the continents and ocean basins and the evolution of life on earth will be discussed based upon information obtained from the sedimentary rock record. Field trips required. Not open to students who successfully completed PHSC 123. Prerequisite: GEOL 121. Gen Ed II.A or Core: Biological & Physical Sciences and Science Lab. Lab/Class fee will be assessed.

GEOL 301 SUSTAINABILITY AND THE USE OF NATURAL RESOURCES (3)
Students will develop a scientific understanding of origin, use, and environmental impact of renewable and non-renewable natural resources. Examines the science behind the policies governing use and conservation of natural resources as well as the impacts associated with overuse of those resources. Topics will include exploration and development of both non-renewable and renewable energy resources and strategic mineral resources and the management and protection of water, air and soil. Prerequisite: GEOL 121.

GEOL 305 ENVIRONMENTAL GEOLOGY (4)
Earth’s natural surface system (hydrologic, atmospheric, and climatic): causes and extent of human modifications; effects and potential solutions to resulting problems. Introduction to standard field and laboratory methods in environmental geology. Field trips required. Three lecture hours and three lab hours. Prerequisite: GEOL 121. Lab/Class fee will be assessed.

GEOL 321 STRUCTURAL GEOLOGY (4)
The identification and analysis of tectonic forms to determine the physical conditions of formation and the context of historical geological events in which they occur. Field trips required. Three lecture hours and three laboratory hours. Students who have successfully completed PHSC 321 will not receive additional credit for GEOL 321. Prerequisites: GEOL 121 and PHYS 211 or equivalent. Lab/Class fee will be assessed.

GEOL 331 MINERALOGY (4)
The study of minerals with emphasis on crystallography, crystal chemistry, and chemical-structural classification. Laboratory identification of minerals in hand specimen, in thin section by application of principles of optical mineralogy, by chemical analysis, and by X-ray diffraction analysis. Three lecture hours and three laboratory hours. Students who have successfully completed PHSC 331 will not receive additional credit for GEOL 331. Prerequisites: GEOL 121 and CHEM 131/131L (CHEM 110).

GEOL 333 PETROLOGY OF IGNEOUS AND METAMORPHIC ROCKS (4)
Study of the properties and genesis of two major rock groups. Megascopic and microscopic techniques in rock classification. Environments of formation. Case studies from the Maryland Piedmont. Field trips required. Three lecture hours and three laboratory hours. Students who have successfully completed PHSC 333 will not receive additional credit for GEOL 333. Prerequisite: GEOL 331. Lab/Class fee will be assessed.

GEOL 357 PHYSICAL OCEANOGRAPHY (3)
Physical, chemical, and geologic characteristics of ocean basins, boundaries, and sea water including origin and behavior of waves and currents. Students who have successfully completed PHSC 357 will not receive additional credit for GEOL 357. Prerequisites: PHYS 211 or PHYS 241 and CHEM 131/131L or consent of the instructor.

GEOL 410 METHODS FOR ENVIRONMENTAL GEOCHEMISTRY (4)
Students will develop an understanding of fate, transport and cycling of geochemically important elements in the environment including natural and anthropogenic sources and their physical and chemical modes of transport in near surface environments. Students will learn basic geochemical and analytical methods applicable to investigations in soils and surface waters. Field trips required. Three lecture hours and three laboratory hours. Prerequisites: GEOL 121, CHEM 131, CHEM 132 or permission of the instructor. Lab/Class fee will be assessed.

GEOL 415 HYDROGEOLOGY (4)
Geologic aspects of groundwater: origin, occurrence, and movement. Field trips required. Three lecture hours and three laboratory hours. Students who have successfully completed PHSC 415 will not receive additional credit for GEOL 415. Prerequisites: Required: CHEM 132/132L (CHEM 111), PHYS 211 or PHYS 241; Recommended: GEOL 321 and GEOL 443. Lab/Class fee will be assessed.

GEOL 421 TECTONICS (3)
Motions and deformation of the earth on a regional to global scale; historical development of plate tectonic theory; case studies from the historic and current geological literature. Course pedagogy combines lecture and student-led discussions. Prerequisites: GEOL 121; GEOL 321; or consent of the instructor.
GEOL 443 SEDIMENTOLOGY AND STRATIGRAPHY (4)
Production, transport, and deposition of sediments and sedimentary bodies for the development of facies models useful in interpretation of the stratigraphic record. Three lecture hours and three laboratory hours. Field trips required. Students who have successfully completed PHSC 443 will not receive additional credit for GEOL 443. Prerequisites: GEOL 121, CHEM 131/CHEM 131L. Lab/Class fee will be assessed.

GEOL 451 PETROLOGY OF SEDIMENTARY ROCKS (3)
Macro-and microscopic analyses of sedimentary rocks. Classifications and diagenetic processes. Offered spring term alternate years. Not open to students who successfully completed PHSC 451.

GEOL 470 SPECIAL TOPICS IN GEOLOGY (1-4)
The study of special topics in the Geosciences. Special Topics will be determined by their need for study and relevance to existing courses. May be repeated with a different topic for a maximum of 6 units.

GEOL 471 SPECIAL TOPICS IN GEOLOGY (1-4)
The study of special topics in the Geosciences. Special Topics will be determined by their need for study and relevance to existing courses. May be repeated with a different topic for a maximum of 6 units.

GEOL 472 SPECIAL TOPICS IN GEOLOGY (1-4)
The study of special topics in the Geosciences. Special Topics will be determined by their need for study and relevance to existing courses. May be repeated with a different topic for a maximum of 6 units.

GEOL 473 SPECIAL TOPICS IN GEOLOGY (1-4)
The study of special topics in the Geosciences. Special Topics will be determined by their need for study and relevance to existing courses. May be repeated with a different topic for a maximum of 6 units.

GEOL 474 SPECIAL TOPICS IN GEOLOGY (1-4)
The study of special topics in the Geosciences. Special Topics will be determined by their need for study and relevance to existing courses. May be repeated with a different topic for a maximum of 6 units.

GEOL 475 SPECIAL TOPICS IN GEOLOGY (1-4)
The study of special topics in the Geosciences. Special Topics will be determined by their need for study and relevance to existing courses. May be repeated with a different topic for a maximum of 6 units.

GEOL 476 SPECIAL TOPICS IN GEOLOGY (1-4)
The study of special topics in the Geosciences. Special Topics will be determined by their need for study and relevance to existing courses. May be repeated with a different topic for a maximum of 6 units.

GEOL 477 SPECIAL TOPICS IN GEOLOGY (1-4)
The study of special topics in the Geosciences. Special Topics will be determined by their need for study and relevance to existing courses. May be repeated with a different topic for a maximum of 6 units.

GEOL 478 SPECIAL TOPICS IN GEOLOGY (1-4)
The study of special topics in the Geosciences. Special Topics will be determined by their need for study and relevance to existing courses. May be repeated with a different topic for a maximum of 6 units.

GEOL 479 SPECIAL TOPICS IN GEOLOGY (1-4)
The study of special topics in the Geosciences. Special Topics will be determined by their need for study and relevance to existing courses. May be repeated with a different topic for a maximum of 6 units.

GEOL 489 INTRODUCTION TO RESEARCH (1)
Developing a research question, designing research projects, writing a proposal, scientific report writing, and oral presentation. As a final project, students develop a research proposal. Graded S/U. Prerequisites: GEOL 121, GEOL 123, and 8 additional GEOL units, or permission of instructor.

GEOL 490 INDEPENDENT STUDY IN GEOLOGY (1-4)
Individual and supervised research in selected areas of Geosciences. Topics may be laboratory or field based. May be repeated for a maximum of 6 units.

GEOL 491 DIRECTED READINGS (1-4)
Independent reading in an area selected by the student in consultation with the instructor. May be repeated for a maximum of 6 units.

GEOL 492 INTRODUCTION TO FIELD METHODS (2)
Surveying techniques, description of geological materials, geological mapping, and environmental investigations. Field trips required.

GEOL 494 TRAVEL STUDY (1-3)
Investigation of field problems and phenomena. May be repeated for a maximum of 3 units.

GEOL 495 RESEARCH PROBLEMS IN GEOLOGY (1-2)
Design and successful completion of a geological research project based on a problem of regional significance. Scope of project determines course credit selected. Project results will be presented in a public forum. Prerequisites: GEOL 121, GEOL 123, GEOL 489 and two additional upper level GEOL courses.

GEOL 499 HONORS THESIS IN GEOLOGY (1-4)
Writing of an honors thesis based on independent research done under the direction of a staff member. May be repeated for a maximum of six credits. Prerequisites: Consent of instructor and open only to advanced honors candidates.